

Meteorological record of voluntary observers and army post surgeons—December, 1884.

Temperature				Temperature				Temperature				Temperature							
Station.	Mean.	Maximum.	Minimum.	Rainfall.	Station.	Mean.	Maximum.	Minimum.	Rainfall.	Station.	Mean.	Maximum.	Minimum.	Rainfall.	Station.	Mean.	Maximum.	Minimum.	Rainfall.
Orono, Me.	23.6	59	-20	4.74	Summit, Va.	36.4	68	4	.....	Wabash, Ind.	26.0	56	-15	5.54	Stromsburg, Nebr.	13.5	57	0	0.46
Cornish, Me.	20.8	52	-18	5.92	Johnsonton, Va.	44.1	70	12	4.90	Monticello, Ind.	26.4	59	-18	5.92	Madison, Nebr.	15.0	64	-2	0.00
Gardiner, Me.	20.8	52	-13	5.05	Kelley, N. C.	45.9	74	8	9.40	Frankfort, Ind.	25.8	57	-13	2.48	Table Rock, Nebr.	19.4	.....	.....	0.44
Antrim, N. H.	27.9	58	-17	5.10	Asheville, N. C.	41.0	68	5	2.90	Attica, Ind.	24.0	55	-18	.....	West Hill, Nebr.	9.9	.....	.....	1.85
Contoocook, N. H.	27.9	58	-17	4.50	Lenoir, N. C.	64	10	10.80	Connersville, Ind.	28.8	60	-11	6.40	Superior, Nebr.	21.5	.....	.....	.....
Weir's Bridge, N. H.	3.67	.....	.....	3.67	Brevard, N. C.	64	10	10.25	Noblesville, Ind.	29.1	55	-16	4.74	West Point, Nebr.	12.9	.....	.....	1.25	
Lake Village, N. H.	4.12	.....	.....	4.12	Lincolnton, N. C.	42.9	60	9.32	Greenfield, Ind.	26.6	58	-11	.....	Greenfield, Mo.	29.0	68	2	3.80	
Bristol, N. H.	5.05	.....	.....	5.05	Stateville, N. C.	37.4	72	10	5.35	Franklin, Ind.	30.8	58	-10	2.70	Springfield, Mo.	31.8	63	5	7.62
Ashland, N. H.	5.10	.....	.....	5.10	Weldon, N. C.	41.0	70	8	5.59	Fillmore, Ind.	25.0	53	-10	7.04	Pierce City, Mo.	29.0	68	1	10.10
Woodstock, N. H.	4.65	.....	.....	4.65	Chapel Hill, N. C.	43.2	68	7	0.93	Farmstead, Ind.	28.1	60	-20	6.19	Centerville, Mo.	32.0	62	14	7.22
Belmont, N. H.	4.22	.....	.....	4.22	Stateburg, S. C.	42.5	68	17	5.87	Mauzy, Ind.	26.1	60	-17	6.14	Conception, Mo.	18.2	53	13	1.46
Wolborough, N. H.	5.05	.....	.....	5.05	Aiken, S. C.	48.0	72	17	6.02	Romney, Ind.	25.5	62	-17	4.68	Chamolis, Mo.	30.2	66	4	4.37
Charlotte, Vt.	23.8	52	-16	2.50	Pacolet, S. C.	42.6	65	15	6.00	Dana, Ind.	26.4	57	-15	4.80	Carthage, Mo.	30.0	67	5	0.91
Burlington, Vt.	20.8	54	-17	2.00	Millidgeville, Ga.	45.8	71	16	4.73	Richmond, Ind.	27.9	57	-15	5.80	Gasgaw, Mo.	26.0	61	5	3.37
Woodstock, Vt.	21.8	52	-20	4.09	Forsyth, Ga.	49.3	73	16	4.73	Columbus, Ind.	30.2	61	-9	6.01	Harrisonville, Mo.	29.8	68	2	3.74
Dorset, Vt.	25.6	56	-20	4.63	Quitman, Ga.	49.3	73	16	4.73	Blue Lick, Ind.	32.5	61	-9	5.56	Trouton, Mo.	31.6	59	6	7.47
Lunenburg, Vt.	21.6	50	-26	0.70	Manatee, Fla.	59.8	86	42	2.00	Marengo, Ind.	35.5	64	-2	7.65	Mascoutah, Ill.	30.8	62	8	5.34
Newport, Vt.	21.9	50	-23	3.21	Archer, Fla.	63.1	78	31	3.75	Huntingburg, Ind.	31.4	62	-6	6.66	Kirksville, Mo.	21.5	60	-12	2.53
Stratford, Vt.	23.0	50	-24	3.80	Mayport, Fla.	62.1	80	40	2.95	Princeton, Ind.	31.4	63	-6	7.70	Louisiana, Mo.	24.0	60	-10	3.20
Williamstown, Mass.	27.9	58	-20	3.72	Tallahassee, Fla.	49.0	70	22	.....	Worthington, Ind.	31.9	60	-9	7.26	Mexico, Mo.	20.3	59	-14	1.60
Hendon, Mass.	30.0	57	-10	.....	Newport, Fla.	57.3	74	27	10.99	DeGonia, Ind.	31.9	65	-4	6.52	Miami, Mo.	24.9	66	6	3.68
Milton, Mass.	33.0	60	-12	4.27	Limona, Fla.	65.9	84	34	0.80	Salem, Ind.	31.0	62	-5	4.98	Oregon, Mo.	20.3	59	-14	1.60
New Bedford, Mass.	33.4	55	-10	5.97	Saint Augustine, Fla.	60.9	80	35	1.87	Corydon, Ind.	31.0	62	-5	6.85	Pleasant Hill, Mo.	20.0	60	-6	1.92
Somerset, Mass.	33.3	58	-14	5.07	Green Springs, Ala.	48.7	72	12	5.39	Bloomington, Ind.	31.9	64	-12	3.49	Steville, Mo.	29.0	67	7	5.45
Princeton, Mass.	27.7	54	-18	9.59	Greensboro, Ala.	49.7	75	16	6.09	Tipton, Ind.	27.1	53	-12	.....	Sedalia, Mo.	21.0	71	8	4.77
Westborough, Mass.	33.0	61	-12	5.49	Mt. Vernon B'ks, Ala.	54.8	80	15	3.10	McLeansboro, Ill.	31.8	62	-8	8.24	Philpe City, Mo.	19.6	53	-10	0.80
Taunton, Mass.	34.0	63	-10	5.31	Birmingham, Ala.	69	10	.....	Mattoon, Ill.	28.5	64	-13	5.45	Saint Charles, Mo.	29.0	67	4	11.37	
Deerfield, Mass.	25.7	59	-16	.....	Point Pleasant, La.	48.9	71	17	20.39	Aurora, Ill.	23.5	55	-10	4.57	Protem, Mo.	29.0	67	4	11.37
Rowe, Mass.	26.2	57	-19	5.03	Liberty Hill, La.	70	29	.....	Sycamore, Ill.	20.5	51	-10	4.14	Atchison, Kans.	22.2	60	-8	0.50	
Fall River, Mass.	33.0	63	-20	9.74	Luling, La.	81	25	6.13	Prairieville, Ill.	20.8	50	-20	3.56	Independence, Kans.	25.4	64	3	3.34	
Worcester, Mass.	28.9	56	-12	5.75	Grand Coteau, La.	57.7	75	25	14.43	Sandwich, Ill.	21.6	54	-13	3.43	Wyandotte, Kans.	21.0	60	3	1.54
Providence, R. I.	34.1	62	-12	0.59	Cleburne, Tex.	38.2	70	8	4.01	Griggsville, Ill.	21.0	57	-13	4.43	Yates Centre, Kans.	21.8	64	7	2.26
Nayatt Point, R. I.	30.0	59	-12	7.03	Fort Brown, Tex.	60.7	83	29	0.80	Wilton Centre, Ill.	25.7	55	-24	5.84	Emporia, Kans.	22.4	61	-10	1.81
Hartford, Conn.	30.0	59	-12	6.09	Clarksville, Tex.	41.8	72	10	7.48	Collinsville, Ill.	29.2	62	-10	5.68	Clay Centre, Kans.	21.5	62	-9	1.12
Southington, Conn.	29.4	51	-13	6.45	Fort Concho, Tex.	42.7	83	10	5.85	Peoria, Ill.	27.3	57	-11	4.88	W. Leavenworth, Kans.	21.0	59	-3	1.93
North Colebrook, Conn.	27.3	57	-20	5.30	Austin, Tex.	49.5	74	27	1.68	Pana, Ill.	27.3	57	-11	4.88	Elk Falls, Kans.	20.0	60	-12	0.80
Bethel, Conn.	27.3	57	-20	5.30	Mount Ida, Ark.	38.2	70	15	15.95	Anna, Ill.	32.5	67	-7	9.57	Maud, Kans.	20.4	60	-12	0.80
Voluntown, Conn.	34.0	62	-12	5.40	Lead Hill, Ark.	29.1	67	4	11.37	Swanwick, Ill.	29.3	60	-13	3.50	Wellington, Kans.	23.1	60	-7	3.14
Fort Hamilton, N. Y.	34.4	60	-1	5.40	Helvetia, W. Va.	35.8	65	0	4.30	Bunker Hill, Ill.	21.7	63	-19	3.84	Allison, Kans.	19.9	60	-22	0.80
Mountainville, N. Y.	29.5	62	-14	5.23	Milan, Tenn.	37.4	65	3	7.25	Palestine, Ill.	29.2	60	-9	3.84	Sterling, Kans.	19.1	62	-10	1.15
Palermo, N. Y.	23.5	53	-19	3.42	Austin, Tenn.	41.5	68	3	3.34	Rockford, Ill.	21.4	47	-19	6.51	Lawrence, Kans.	23.5	60	-6	2.56
Auburn, N. Y.	30.7	58	-17	2.41	Ashwood, Tenn.	40.0	64	3	3.70	Greenville, Ill.	29.3	62	-21	3.28	Topeka, Kans.	23.3	62	-6	1.62
Humphrey, N. Y.	24.2	55	-23	3.69	Greenville, Tenn.	42.0	69	10	2.50	Biley, Ill.	19.4	51	-21	3.28	Sherlock, Kans.	15.9	70	-16	1.38
Menand, N. Y.	27.5	53	-20	3.13	Maryville, Tenn.	41.0	67	9	0.60	Centralia, Ill.	30.0	60	-10	5.50	Holton, Kans.	21.0	62	-10	1.50
Ithaca, N. Y.	29.2	58	-20	2.42	Andersonville, Tenn.	40.0	67	9	3.33	Hudson, Mich.	24.3	53	-28	2.33	Richardton, Dak.	3.2	41	-36	1.50
Le Roy, N. Y.	28.1	63	-3	2.18	Careyville, Tenn.	38.0	66	0	6.21	Hillsdale, Mich.	21.6	48	-19	4.14	Fort Yates, Dak.	5.2	52	-37	0.50
Penn Yan, N. Y.	27.0	56	-22	1.99	Parkeville, Tenn.	42.0	70	9	6.71	Manistiquie, Mich.	21.6	48	-19	5.05	Fort Buford, Dak.	0.3	58	-43	2.04
Cooperstown, N. Y.	27.0	56	-22	1.99	Sunbright, Tenn.	38.0	66	0	2.19	Ionia, Mich.	24.7	52	-24	5.25	Fort Totten, Dak.	0.3	45	-40	0.63
North Volney, N. Y.	20.5	57	-15	3.50	Grief, Tenn.	40.0	70	7	6.49	Northport, Mich.	47	11	-5.70	Fort Sisseton, Dak.	3.2	42	-38	1.31	
Port Jervis, N. Y.	28.0	56	-7	4.23	Farmingdale, Tenn.	38.0	66	4	7.20	Traverse City, Mich.	47	11	-5.70	Fort Sully, Dak.	8.7	59	-37	0.63	
Factoryville, N. Y.	28.2	58	-12	2.73	Forstia, Tenn.	38.0	66	4	7.20	Kalamazoo, Mich.	49	19	-9	7.14	Fort Randall, Dak.	11.0	58	-31	1.08
White Plains, N. Y.	34.3	59	-6	5.05	Grassy Cove, Tenn.	36.0	60	0	4.15	Thorville, Mich.	27.4	53	-14	3.07	Fort Meade, Dak.	6.5	73	-32	0.90
Fort Niagara, N. Y.	29.5	54	-1	1.70	Cookeville, Tenn.	38.0	67	4	4.98	Bozette, Mich.	23.6	51	-17	6.52	Fort A. Lincoln, Dak.	1.7	48	-43	1.00
Fort Columbus, N. Y.	33.8	66	3	6.44	McMinnville, Tenn.	38.0	65	4	5.25	Lansing, Mich.	26.0	55	-22	2.77	Webster, Dak.	9.1	61	-36	1.52
West Point, N. Y.	31.9	64	-12	6.20	Manchester, Tenn.	38.0	67	4	7.16	Mottville, Mich.	24.2	52	-17	.....	Vermillion, Dak.	6.0	60	-30	0.70
Madison Barracks, N. Y.	24.9	57	-29	2.08	Riddleton, Tenn.	40.0	72	4	4.85	Moorestown, Mich.	24.2	51	-33	2.80	Fort Collins, Colo.	22.1	60	-11	0.35
Plattsburg Barracks, N. Y.	22.6	53	-19	1.26	Beech Grove, Tenn.	39.0	64	4	4.85	Embarras, Wis.	17.4	40	-43	4.75	Pueblo, Colo.	22.1	60	-15	0.78
David's Island, N. Y.	35.4	62	-7	8.75	Flat Creek, Tenn.	40.0	63	0	7.04	Sussex, Wis.	17.9	44	-25	4.75	Fort Lewis, Colo.	25.6	53	-13	4.30

Frosts.—Delta, 1st, 2d, 19th, 25th, 26th; Mandeville, 19th; Clinton, 1st, 2d, 9th, 15th; Donaldsonville, 9th, 14th, 19th; Thibodaux, 19th; Alexandria, 18th, 19th; Lafayette, 1st, 19th; Franklin, 19th; Whiteville, 1st, 19th; Houma, 19th; Baton Rouge, 1st; Lake Providence, 1st, 2d, 18th, 19th, 23d, 24th, 25th, 26th; Cheneyville, 1st, 2d, 19th, 26th; St. Joseph, 1st, 18th, 19th, 26th; Monroe, 1st, 2d, 3d, 15th, 18th, 19th; Point-a-la-hache, 18th; Vidalia, 18th, 25th.

General notes.—Waves of low pressure existed in the state on the 3d and 4th, 5th and 6th, 11th and 12th, 20th and 21st, and 23th to 30th, each accompanied with excessive rainfall, that of the 29th and 30th being very heavy. Intervening cold waves of greater or less severity came from the northwest, that of the 19th being the coldest throughout the state. In brief, the month was a fair sample of our worst December weather, with immense range from heat to cold in a few hours. The heavy rains have filled the water courses and lowlands earlier than usual.

The temperature at New Orleans was about the average, while the rainfall was above it. The rains are now making up their shortage for months past.

The attention of those interested in meteorology is called to the Signal Service display in the Main Building at the Exposition, which will repay a visit.

The following is an extract from the December, 1884, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., of Auburn:

The month of December possessed no features of unusual interest. From the 1st to the 12th the temperature was moderate, with a few frosts, and some showery days; winds variable. In north Alabama the warmest period of the month was from the 6th to the 12th. The first cold wave warning received on the 12th was justified by a fall of twenty or thirty degrees on the 13th. This sudden fall was preceded in a few localities by high winds of tornadic violence, accompanied by thunder and lightning. From the 13th to the 17th the temperature was variable, with winds shifting from northwest to east, and some heavy rains. The second cold wave warning was telegraphed on the 17th; and the 18th and 19th were the coldest days of the month throughout the state, with a fall of thirty to forty-five degrees. At this period a slight fall of snow was general over middle and north Alabama. The wind then changed from northwest to southwest, and the temperature rose rapidly until the 22d. This was the day of greatest warmth in middle and southern Alabama. The third cold wave warning received on the 22d was followed by a reduction of temperature of from fifteen to thirty degrees. On the 26th the temperature rose again, and the remaining days of the month were mild, cloudy, and showery, with winds from the east and southeast.

There were six days without rain.

The precipitation was 5.61 inches, about one inch above the normal.

The temperature was 48.3 degrees.

The rainfall for Union Springs for the past year was 41.40 inches; two inches below the average (43 inches) for that place, and seventeen inches below the average (58 inches) for the state.

The rainfall for Auburn during the last year was 50.52 inches, about eight inches below the average for the state.

State summary.

Mean temperature, 48°; highest temperature, 80° at Newton on the 22d; lowest temperature, 6° at Gadsden on the 19th; range of temperature, 74°; greatest monthly ranges of temperature, 62° at Mt. Willing and Gadsden; 64° at Calera; least monthly ranges of temperature, 46° at Clanton; 56° at Chattanooga; greatest daily ranges of temperature, 45° at Tuscaloosa on the 19th; 64° at Calera on the 22d; least daily ranges of temperature, 0° at Wetumpka and Clanton on the 31st; 5° at Birmingham on the 5th.

Mean depth of rainfall, 5.61 inches; mean daily rainfall, 0.18 inch; greatest depth of monthly rainfall, 8.94 inches at Prattville; least depth of monthly rainfall, 2.99 inches at Union Springs; greatest daily rainfall, average for the state, 1.86 inches on the 14th; greatest daily rainfall, 3.50 inches at Prattville, and 3.40 inches at Tuscaloosa on the 14th.

Days of general rainfall, 14th, 21st; average number of days on which rain fell, 10; average number of cloudy days, 18; average number of fair days, 8; average number of clear days, 5.

Warmest day, 22d; coldest day, 19th.

Prevailing direction of wind, southeast.

Thunderstorms were reported from Auburn on the 12th, 14th, 21st, and 22d; Birmingham, Carrollton, Florence, and Tusculumbia on the 21st; Greensboro on the 20th; Summerville on the 14th and 21st.

Frost was reported from most stations on the 1st, 3d, 8th, 9th, 10th, 16th, and 19th.

A slight fall of snow reported from all quarters in north Alabama on the 18th.

Ice was generally reported on the 1st, 3d, 16th, 18th, 19th, 20th, 23d, 24th, 25th, and 26th. At Greensboro, on the 19th, the ice was an inch and a half thick; and at Tusculumbia it was thick enough for skating.

The following is an extract from the December, 1884, report of the "Missouri Weather Service," under the direction of Prof. Francis E. Nipher, Saint Louis:

The mean temperature at the central station has been 29° 8, which is 3° 6 below the normal temperature for December at Saint Louis. December is

colder than it has been during the past month about one year out of four. The mean of December fell as low as 23° 3 in 1872 and 1876.

The extremes of temperature during last month were *minus* 10° and 63°, which are not quite unusual, as temperatures as low have been observed in December seven times before. In 1872 (December 24) Engelmann recorded a temperature of —19° 5, and in 1880 one of —18.

During the last ten years some of our coldest as well as some of our warmest Decembers have occurred. For instance, in 1876 the mean fell to 23° 2, while in the next year it rose to 46° 5. The rain (and melted snow) has been 6.63 inches, the normal precipitation being 3.00. The fall of the past month has been exceeded but twice since 1839, viz.: in 1858, when the rainfall was 8.58 inches, and in 1849, when it was 10.90 inches.

In the state the lowest temperature reported is —16°, at Phelps City, which station also reports the lowest mean, 19° 6.

The rainfall varies quite uniformly from 0.8 in the extreme northwest part of the state to 9.0 in the southeast.

The snowfall of the month has been 14 inches at the central station, increasing to 16 inches at Louisiana and 17 inches at Mexico, where the maximum fall is reported. To the northward and westward the fall diminishes to 3 inches at Kirksville, 6.5 at Glasgow, 7 at Miami, 7 5 at Oregon, and to the southward, 12 at Chamois, 7 at Centerville, and 3 at Greenfield. At the close of the month the northern part of the state had a snow cover of from 0.5 to 1 inch, the snow line passing from a point somewhat south of Kansas City eastward along the Missouri river to near Washington, and thence northwardly to Hannibal.

Mr. Wm. Kancher, of Oregon, gives the mean annual temperature of that place for the twenty-nine years ending with 1884 as 51° 43. During that time the total rain (and melted snow) was 89.4 feet, with a mean annual fall of 37.03 inches. The total snowfall was 90.6 feet, being an annual fall of 37.53 inches.

The following is the bulletin for December, 1884, of the "Iowa Weather Service," under the direction of Dr. Gustavus Hinrichs, of Iowa City:

December, 1884, was windy, cloudy, and very cold, with frequent and much precipitation, northwesterly winds prevailing.

The mean temperature of the air was 5° below normal. December has not been as cold since 1880, and has but five times been colder during the past forty-six years. The first decade was decidedly mild, being 7° above normal. The second decade was extremely cold, averaging 14° below normal. The third decade was as severe during its first half, but quite warm during the four days of thaw and rain of the last half, so as to average only 8° below normal. On ten days of the month the temperature fell to or below zero Fahrenheit, namely, from the 16th to the 19th, from 22d to the 26th, and on the 31st. The first "cold spell" came on gradually, but the second and last were quite sudden.

Precipitation was very frequent, a measurable amount falling on nineteen days. Generally it was a light or moderate snow, except from the 27th to the 30th, when rains were general, continued, and quite abundant. Sleighing was good until this thaw set in.

The month and the year closed with a brilliant and greatly varying lunar halo. The nearly full moon rose on the last day with a fine luminous cross, thereafter showed fine mock-moons, also the common luminous circle, and at midnight the lower contact arch appeared like a brilliant inverted rainbow in the south below the moon and its ring.

The probability given at the close of the November bulletin is and proved to be simply a direct statement of fact, so far as we possess the same, namely, for the past forty-six years. If the present winter continues to be severe, we shall have had three consecutive winters much more severe than any three consecutive winters of which we have any record in Iowa. Thus far, a decidedly cold December has five times in seven been followed by a cold January.

The following is an extract from the December report, 1884, of the Nebraska Weather Service, under the direction of Prof. Goodwin D. Swezey:

During the seven years, since our weather service has been established, there has been no December so cold, so cloudy, or with so large a snowfall as the past month. The mean temperature has been lower and the number of days below zero greater, although the number of moderately cold days has not been in excess. The lowest temperature of the month has been exceeded but once during this time, viz., in 1880.

The snowfall has been larger than any December previous during these seven years, being about double the normal amount. The precipitation has not been much above the average but has been almost wholly in the form of snow. The number of days on which snow fell has been greater than ever before during this time and also the number of cloudy days.

Precipitation.—The average of rain and melted snow, chiefly the latter, for the different sections of the state for December, 1884, is as follows: ne. section 1.28 inches; se. section 0.60; nw. section 1.07; sw. section 0.47. Greatest number of rainy or snowy days, eighteen, at Omaha.

No thunder or hail-storms have been reported during the past month; such are unusual in December, having occurred only once during the past seven years, viz., in December of 1882. Fogs have occurred but not to a marked extent.

The following is an extract from the December, 1884, report of the "Minnesota Weather Service," under the direction of Prof. William W. Payne, of the Carleton College, Northfield:

A review of the weather at Carleton College observatory for December, 1884, shows us interesting features, a period of mild weather, lasting from the 1st to the 8th, inclusive, with low barometer, west and southwest winds, and a range of temperature from 15° 0 to 45° 2. The mean temperature was 18° 6 colder than November, this year, and 7° 7 colder than December, 1883. The maximum temperature was above 40° 0 on the 2d, 3d, and 4th, the maximum for the month (45° 2) occurring on the 3d. A heavy rain, freezing as it fell, began at 5 p. m. on the 6th, changing into heavy snow during night. Previous to this the three inches of snow on the ground at the beginning of the month had nearly disappeared. Comparatively mild weather prevailed from the 9th to the 15th, inclusive, with a range of the temperature from -2° 5 to 27° 5. Very light snow occurred at intervals on the 12th and 13th, followed by a fall of three inches on the 14th. A bright yellow sunset was noted on the 9th. On the 15th there was a decided fall in temperature, the first zero reading of the month being recorded, and a rapid increase in pressure, the barometer showing a high range and the temperature remaining constantly below zero until 7 a. m. on the 20th. The 18th and 19th were very cold days, showing a maximum of only -15° 5 and -3° 5 and a minimum -28° 0 and -29° 0, respectively, the mean temperature of the 18th being -22° 2.

The precipitation was greater than the average for a winter month, being 1.70 more than November, 1884, and 0.72 more than for December, 1883.

The following is an extract from the December, 1884, report of the "Tennessee Weather Service," under the direction of Hon. A. J. McWhirter:

The special meteorological features for December were the low temperature which prevailed throughout the state on the 19th and the high winds which prevailed about the 21st. Except these there was little outside the normal status of the weather for the month.

The mean temperature for the month was 39° 14, 3° 73 below the December mean of last year and 5° 96 below the mean for November. The mean of maximum temperatures was 65° 4, 1° 6 below, and the mean of minimum temperatures was 5°, 14° below those for December of last year. The range of temperature was 7° greater than that in December of last year. The highest temperature was general in the eastern part of the state on the 29th, 30th; in the middle division on the 11th, 30th, and in the western division on the 4th, 30th. The lowest temperature was general throughout the state on the 19th, only two exceptions being reported, viz.: Andersonville, in the eastern division, and Covington, in the western, on the 18th. The lowest temperature was reported at Dyersburg, and was 1° below zero. The lowest temperatures were generally in the western division—rather a departure from the normal.

The mean depth of rainfall was 5.32 inches, 1.01 inch greater than the December mean of last year, and 3.76 inches greater than the November mean. There was a very fair distribution of precipitation throughout the state, the extremes being from 2.19 inches at Sunbright to 9.14 inches at Memphis. Only three stations report under three inches. A very small proportion of this precipitation was of melted snow. The days of the greatest rainfall were the 5th, 6th, 11th, 14th, 18th, 21st, and 31st. The greatest daily rainfall was on the 21st, averaging for the state 1.46 inches. The greatest local daily rainfall was 3.05 inches on the 29th at Memphis. The rains of the 5th, 6th, 11th, 14th, 18th, 21st, and 31st were general. The rain of the 12th was confined almost exclusively to the eastern division; that of the 20th to the middle and western divisions, and that of the 22d to the eastern and middle divisions. The rains of the 27th, 28th, 29th, and 30th were mostly confined to the western division. The 1st, 2d, 3d, and 8th were rainless days.

The snowfall during the month was light, averaging only 0.25 inch for the state. The greatest depth reported was 2 inches, at Greeneville and Sunbright.

There were several frosts—many of them were general, viz.: 2d, 3d, 7th, 9th, 10th, 16th, and 26th; that of the 16th was perhaps the heaviest of the month.

Thunder-storms were reported as follows: Greeneville, 22d; Knoxville, 22d, from 4 to 6 a. m., from se.; Maryville, 22d, 3 a. m., very loud thunder and vivid lightning; Farmingdale, 22d, from w. to e., 14th; 21st from n.: Riddleton, 6th, 2 p. m., clouds' direction sw., wind direction se., force 5; 2.15 p. m., wind se., force 7; thermometer at 7 a. m., 58°, 2 p. m., 51, 9 p. m., 50°; rainfall, .49 inch; Pulaski, 21st; Savannah, 21st; Milan, 28th, 3 a. m., in s. and sw., motion n., rain 1.25 inch; Trenton, 30th, 7.30 p. m.; Bolivar, 21st; Dyersburg, 30th, 7 p. m., from sw. to ne., with brilliant, bluish lightning and loud thunder; Somerville, 31st; Memphis, 28th.

Distant thunder was heard as follows: Riddleton, 11th, 10.30 p. m., nw.; Savannah, 11th; Milan, 30th, 6.55 p. m., w.; Trenton, 30th, 7.30 p. m., w., with lightning.

Distant lightning was observed as follows: Quarter, 5th, 22d, sw. and nw.

State summary.

Mean temperature, 39° 14; highest temperature, 72°, on the 30th, at Riddleton; lowest temperature, -1°, on the 19th, at Dyersburg; range of temperature, 73°; mean monthly range of temperature, 60° 4; greatest monthly

range of temperature, 69°, at Dyersburg; least monthly range of temperature, 49°, at Sailor's Rest; mean daily range of temperature, 14° 8; greatest daily range of temperature, 37°, on the 3d and 27th, at Grief; least daily range of temperature, 1°, on the 5th, at Savannah, Trenton, Bolivar, Dyersburg, and Somerville; on the 12th, at Greeneville; on the 13th, at Waynesboro; on the 15th, at Parksville; on the 21st, at Riddleton; on the 28th, at Kingston Springs; on the 29th, at Florence Station and Howell, and on the 30th, at Grassy Cove; mean of maximum temperatures, 65° 4; mean of minimum temperatures, 5°.

Mean depth of rainfall, 5.32 inches; mean daily rainfall, .171 inch; greatest rainfall, 9.14 inches, at Memphis; least rainfall, 2.19 inches, at Sunbright; greatest local daily rainfall, 3.05 inches, on the 29th, at Memphis; days of greatest rainfall, 6th, 11th, 14th, 21st, and 31st: day of greatest rainfall during month, 21st.

Average number of days on which rain fell, 10.3; average number of clear days, 5.8; average number of fair days, 6; average number of cloudy days, 18.2.

Prevailing direction of wind, north.

Average snowfall during month, 0.25 inch.

Prof. W. H. Ragan, of Greencastle, Indiana, furnishes the following meteorological summary for the state, with the accompanying remarks:

Districts.	Temperature.				Precipitation.	* Departure from normal
	Highest.	Lowest.	Monthly mean.	* Departure from normal		
Northern counties.....	62	-20	26.1	-6	5.62	+3.00
Central counties.....	62	-31	27.2	-5	6.34	+3.00
Southern counties.....	66	-12	32.4	-4	5.73	+2.00
State.....	66	-31	28.6	.....	5.90	.....

* NOTE.—The departures are approximated.

The first and last days of the month were moderately warm; the middle of the last half was very cold, when the lowest temperatures for the month occurred in nearly all parts of the state at almost the same hour, as nearly as can be ascertained from the observers reports. Ample warning of the approach of this cold wave was given by the Signal Service, which was of great value as distributed, but the benefits would have been far greater had the proper provision been made to profit by it in all parts of the state. The month of December, 1876, was the coldest on our records and 1877 the warmest. Four Decembers were colder than that of 1884 at Indianapolis; two at Romney, and nine at Vevay, in the periods covered by the records, viz.: for thirteen, twelve, and twenty-two years, respectively. The variations in the mean temperature of the month are very great, showing an extremely variable winter climate.

In previous Decembers the precipitation was greater, one year at Romney and nine years at Vevay. At Indianapolis the precipitation for the year 1884, was greater than in three of the twelve years immediately preceding. At Romney it was greater than in nine out of twenty-one years.

This year for the first time every station of the Indiana Weather Service reported minus temperatures in December.

The snowfall was, it is believed heavier than usual in the northern and central counties.

The following is an extract from the December, 1884, bulletin of the "New England Meteorological Society":

The New England Meteorological Society is a voluntary association of persons interested in the study of atmospheric phenomena in New England. Meetings are held on the third Tuesdays of October, January, and April, at places designated for each meeting. All who desire to further the interests of the society are invited to apply to the secretary for membership. Each member pays an annual fee of \$3. There is urgent need of increasing the membership, since the society depends upon the fees of members for meeting its current expenses. The bulletin is published monthly, and contains a summary of the meteorological conditions of the preceding month, with other items of interest. It is furnished without charge to members and co-operating observers. Observations are welcomed from any one, and circulars have been prepared, containing suggestions as to instruments and methods of observation, which aim to promote greater uniformity and accuracy among observers. The circulars and blank forms for recording the observations can be obtained by applying to the director.

Correspondence relating to the society and to membership should be addressed to W. M. Davis, secretary, Cambridge, Massachusetts.

Correspondence relating to matters of observation should be addressed to Winslow Upton, director, Providence, Rhode Island.

SUMMARY FOR DECEMBER, 1884.

The following discussion of the meteorological conditions of the month is based upon reports from sixty-four observers, seven of whom are observers of the U. S. Signal Service. Use has been made of the daily weather maps of the Signal Service, and of various other publications.

General conditions.—The month has been disagreeable and stormy, and characterized by excessive precipitation, high average temperature, and rapid changes between the extremes of heat and cold.

Precipitation.—The partial drought of the autumn months was followed by abundant rain and snow. The average precipitation in different parts of New England, for December, varies from 2.5 to 5.5 inches; in the past month the smallest amount reported was 2.60 inches at Burlington, Vermont, and the greatest 9.59 inches at Princeton, Massachusetts. The comparisons show a large excess over the average of former years, except in the northern portions of New England, where the amount is not far from normal. This excess was due to the especially heavy rainfall in the three principal storms of the month. The snowfall has been abundant, but the high temperatures of the closing days of the month caused it to disappear completely in the southern portion, and left only traces in the northern portion of the district.

Temperature.—The temperature has been above the average, but there have been extremely low as well as high temperatures, and rapid changes between the two extremes. Three distinct periods of high temperature may be noted, which occurred in conjunction with the leading storms, while a fourth prevailed on the closing days of the month.

Two periods of low temperature were especially marked, one on the 19th and 20th, the other on the 26th and 27th. The former was very severe and widespread. In many places the mercury was below zero during the whole of the 19th, and a strong wind was blowing. The second cold period was confined to the northern portion of the district, but at a few stations the minimum of the month was observed during its occurrence.

In connection with the latter an anomalous condition of temperature was shown in New Hampshire. On the morning of the 27th, when the wind was everywhere light, the temperature at the summit of Mount Washington, $+16^{\circ}$, while at stations at lower levels north of the Massachusetts boundary, the temperatures ranged from -10° to -24° . A more striking instance of the disturbance of the usual law of decrease of temperature with increase of altitude is rarely noted.

The rapidity of changes was a marked feature in the temperature. The storm of the 21st and 22d, with high temperatures, followed the severe cold of the 20th, and the difference of temperature in forty-eight hours was in many instances above 60° . At Providence, R. I., the self-recording thermometer in the office of the city engineer showed a rise of 62° in forty-three hours, and at Norfolk, Connecticut, the range between the minimum on the 20th and the maximum on the 22d was 73° .

The month began with no frost in the ground in southern New England, and at its close the frost was again out of the ground in the southern portion and to a great extent in the northern portion.

Storms.—The storms of the month were all general throughout the district. Three barometric depressions of special note passed over the lake region and Saint Lawrence valley, though not over New England itself.

These depressions were attended by very high temperatures and excessive rains. They passed near New England on the 7th, 15th, and 22d, respectively, and in each case the barometric pressure at the storm-centre was 29.3 inches. The rains were most abundant in the southern portion of the district, many stations reporting more than two inches in each storm. The winds were high, as is usual with depressions of this extent.

Winds.—The wind velocities reached their maximum values for the month in connection with the storms just mentioned. At New London, Connecticut, the maximum, forty miles per hour, occurred with the first storm; at Eastport, the maximum, forty-eight miles, with the second; and at Boston, the maximum, forty-four miles, with the third. High winds also occurred as the barometer rose after the depression had passed. The wind at the summit of Mount Washington was so severe in the early part of the month that all the anemometers were damaged and the wind record for the month rendered incomplete.

Miscellaneous.—No auroras were observed for a certainty, though on several dates their presence was suspected.

Earthquake shocks were reported at Centre Harbor, New Hampshire, and adjoining towns, on the 17th, and at Northampton, Massachusetts, on the 4th, at 12.18 a. m.

Lightning and thunder were noted at Middletown, Connecticut, on the 6th; at Provincetown, Massachusetts, on the 20th; and at Taunton, Massachusetts, on the 23d.

The coloring of the sunset sky was noteworthy, and was as pronounced at the close of the month as at the beginning. On the 30th, at Providence, Rhode Island, the pinkish glow appeared thirty minutes after sunset; five minutes later the color was orange, and fifty minutes after sunset an orange line at the horizon was still plainly visible. A haze was noted about the sun on all clear days.

The following is an extract from the December report of the "Illinois Weather Service," under direction of Mr. S. D. Fisher:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
Northern counties	61.2	-21.3	23.3	4.16
Central counties	66.0	-13.0	26.2	4.74
Southern counties	67.0	-10.0	31.2	7.29
State	67.0	-21.3	26.9	5.40